This study aims to through the light on the impact of environmental changes on groundwater in Qalubiya Governorate. The study area is located on the eastern side of the Damietta Branch and constitute the southeastern part of the Nile Delta, it extends between latitudes 30° 6´ 20″, 30° 36´ 26″ N, and longitudes 31° 3´ 0, 31° 35´ 20″ E. It is bounded from the south by Helwan, Cairo, Giza, and the sixth of October Governorates, from the north by Dakahlia and Gharbia Governorates, from the east by El-Sharkia Governorate and from the west by El-Monofia Governorate. The total area of the Governorate is estimated to be 1001.09 km2, where the cultivated area is 810 km2 ( 81% of the total area). The climate of the study area is characterized as a semi-dry, with an average annual rainfall 20.5 mm / year, while the average temperature is 35.9 ° during the summer, and 6.3 ° during the winter.

The study area is mainly covered by the Quaternary sediments, which belong to the Pleistocene and Holocene. The Pleistocene sediments composed of sand and gravel with clay lenses and covered by the Holocene Nile silt and clay. Miocene sediments are composed of clay, sand, calcareous sandstone and sandy limestone intercalations outcrop at the eastern portions. Basaltic rocks belonging to Upper Oligocene age are exposed at Abu Zaabal Quarries. Abu Zaabal area is affected by major faults trending NNW-SSE, NW-SE, and E-W. Moreover, minor normal faults with little displacement not exceeds one meter were noticed. The joint are well developed through Abu Zaabal basalts where the primary columnar joints are represented as well as the secondary tension and shear joints of various attitudes. These structures play an important role on the geomorphology and on the formation of water ponds at Abu Zaabal area.

The study dealt with the morphology of the surface by digital elevation model (DEM) to delineate elevations, the slopes and their trends. This study depends on maps and satellite images of various kinds and accuracy, It was evident from the morphological study that the topographic range reachs up to 180 m, which started from 9 m to 160 m. The surface of the study area is dominated by medium height, except the southeastern part. It was also noticed that the land with flat and semi-flat slopes attains 76% of the total land of the Governorate. The investigations and comparison of old maps with modern Satellite images shows some morphological change occurs in a sand island in Mit Kenana Tokh center, The area decreased from 3313 m2 in 1973 to 1632 m2 in 2010. The area of sand dunes at El Khanka decreased from 16.734 km 2 during 1984 and to 6.917 km 2 in 2005, also decreased by 9.817 km 2, this means a disappearance of about 58.7% of the total area of sand dunes, and appearance of reclamed land and urban zones. There are also some positive environmental changes at Mit Rady, El Ramla (Benha center) and Shalkan (El-Qanater El-Khairia center) villages. The soil was divided according to their permeability of groundwater to three main types, these are; low soil permeability and medium permeability and high permeability.

The impact of human activities on groundwater was clear, where the increase of population is one of the main reasons for increasing consumer pressures on groundwater, increasing rates of pollution and reduces water quality. A significant increase in the rate of population growth in Qalubiya Governorate province, as the population has nearly doubled, rising from 2,397,788 people in 1986 to 4,251,672 people in the 2006, consequently, the annual growth rate during the two censuses was 1.6%. The recorded highest concentration of population density exists in the city of Shubra al-Khaimah and the lowest one in El- Obour city.

Qalubiya Governorate covered by a large network of canals with a total length of 794 km, and the agricultural lands cover areas of 194.187 hectares. In spite of that, the Governorate is heavily depend on groundwater to meet their needs, where 51 wells, with depths ranging from 90 m to 100 m, distributed within all centers of the province , most of them exist in Tokh center.

The analyses of groundwater samples collected from various centers of the Qalubiya Governorate indicate pollution in most of samples, represented by high concentrations of Calcium, Magnesium, Potassium, Sodium, Bicarbonate, chlorides, sulfates, iron, lead. High rates of pollution is recorded in the southern parts of Qalubiya; especially in the industrial area Shubra al-Khaymah, and parts in Shibin Al-Qanater such as Tel Bani Tamim, this can be reffered- to the lack of sanitation services. Some samples infected with E. Coli pathogens that lead to water pollution and the occurrence of Tivod and cholera, as has been observed in the village of Albaradea ( Al-Qanater Al Khiriya.

Many problems related to groundwater in the study area, including; rising of groundwater, salt weathering, salinity of soil, and the destruction of roads and buildings. Besides the formation of water ponds in Aabu Zaabal which evolved dramatically, with increased area of 0.053 km 2 in 1984 to 0.152 km2 in 2001, by a change amounted to 0.099 km 2, Then expanded the area in 2010 to 0.647 km 2 change by about 0.495 km 2, resulting in problems affected the surrounding area. The water seeps from such ponds contaminate groundwater. The water in the ponds is a mixture or groundwater with sewage, industrial and agricultural waste laden with pesticides and chemical fertilizers.

The study concludes a proposed map describes the degree of pollution of groundwater in Qalubiya and clarifies the ways for sustainable development and protection of groundwater. High pollution rate occurs mainly in the south and southeast of the Governorate, low values of pollution is recorded in northern and eastern regions, while the observed moderate risk of pollution in west and central Qalubiya. The study suggests important mechanisms that must be implemented for the development and protection of groundwater in a sustained manner, such as rationalization and improvement of water, keep water free of pollution, and reducing as much as possible of the amount water lost.